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Sunday, September 07, 2008

A letter from the industrial revolution

Images: Copper halfpenny minted by the Darbies' Coalbrookdale Company and celebrating the Iron Bridge.

Here's an interesting letter from the dawn of the industrial revolution. It was written in 1775 by Abiah Darby, mother of Abraham Darby (III) and wife of Abraham Darby (II), the son of Abraham Darby (I), who invented the process of smelting iron with coke made from coal. The Darby family were Quakers and produced several early industrialists and engineers. This small letter makes or implies several points that may have been crucial to the growth of industry that makes modern wealth possible:

* The importance of property rights and market prices in maintaining a sustainable balance between the supply and demand of wood. ("woods for charcoal became very Scarce and landed Gentlemen rose the prices of cord wood exceeding high"). Although wood became expensive, there remained a sufficient supply of wood for the buildings, mine works, wagons, rails, etc.

* The ability of people living with sufficient technology and secure property rights to bypass and surpass ecological limitations (in this case substituting coal for wood, and later due to this cheap iron-making process, iron and steel for wood).

* Decentralized money issue. Abiah points out that the remote area of Coalbrookdale, where coal and iron were available, still often operated as a barter economy. Thus apparently Abraham had to either coin tokens or open a bank to issue notes (common during this era) so that the Darbies could pay their workers.

* Darby II's invention of the iron-tracked railroad (improving the productivity of the horses by over six times and precursor to the later steam-powered railroad).

* The ability to securely establish large machine works and lay 20 miles of track out in the boondocks and not have them be torn up by trespassers and used for other purposes or confiscated or taxed into oblivion by local lords. In most of the rest of the world that could not be taken for granted.

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Nick Szabo

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* The use of atmospheric pressure (Papin/Savery/Newcomen) steam engines to drain the mines and supply water to the waterwheel pond. (The atmospheric engine apparently wasn't up to the job of directly powering the bellows for the blast furnaces; that came later with the Watt steam pressure engine). Steam engines allowed water to be pumped out of mines at a far greater rate, and thus allowed coal and iron mines to be dug far deeper, creating a large and inexpensive new supply of coal and iron.

The link is a Word document, which I don't recommend opening for security reasons, but I've copied the contents below:

http://www.umassd.edu/ir/Resources/MetalandMining/m2.doc

Mrs. Abiah Darby on developments in the Darby ironworks at Coalbrookdale, 1708-1763

Esteemed Friend,

Thy very acceptable favour of the 9th ulto. claim'd my earliest acknowledgments, which I should immediately have made, had not thy kind condescension in taking notice of my late honour'd Husband, and requesting to be inform'd of any circumstance which may be interesting relating him, caused my delay-to recollect what might occur concerning his transactions or improvements in the Manufactory of Iron, so beneficial to this nation. But before I proceed further, I cannot help lamenting with thee in thy just observation, " that it has been universally observed, that the Destroyers of mankind are recorded and remembered, while the Benefactors are unnoticed and forgotten". This seems owing to the depravity of the mind, which centres in reaping the present advantages, and suffering obscurity to vail the original causes of such benefits; and even the very names of those to whom we are indebted for the important discoveries, to sink into oblivion. Whereas if they were handed down to posterity, gratitude would naturally arise in the commemoration of their ingenuity, and the great advantages injoyed from their indefatigable labours-I now make free to communicate what I have heard my Husband say, and what arises from my own knowledge; also what I am inform'd from a person now living, whose father came here as a workman at the first beginning of these Pit Coal Works.

Then to begin at the original. It was my Husband's Father, whose name he bore (Abraham Darby and who was the first that set on foot the Brass Works at or near Bristol) that attempted to mould and cast Iron pots, &c., in sand instead of Loam (as they were wont to do, which made it a tedious and more expensive process) in which he succeeded. This first attempt was tryed at an Air Furnace in Bristol. About the year 1709 he came into Shropshire to Coalbrookdale, and with other partners took a lease of the works, which only consisted of an old Blast Furnace and some Forges. He here cast Iron Goods in sand out of the Blast Furnace that blow'd with wood charcoal; for it was not yet thought of to blow with Pit Coal. Sometime after he suggested the thought, that it might be practable to smelt the Iron from the ore in the blast Furnace with Pit Coal: Upon this he first try'd with raw coal as it came out of the Mines, but it did not answer. He not discouraged, had the coal coak'd into Cynder, as is done for drying Malt, and it then succeeded to his satisfaction. But he found that only one sort of pit Coal would suit best for the purpose of making good Iron. -These were beneficial discoveries, for the moulding and casting in sand instead of Loam was of great service, both in respect to expence and expedition. And if we may compare little things with great-as the invention of printing was to writing, so was the moulding and casting in Sand to that of Loam. He then erected another Blast Furnace, and enlarged the Works. This discovery soon got abroad and became of great utility.

This Place and its environs was very barren, little money stiring amongst the Inhabitants. So that I have heard they were Obliged to exchange their small produce one to another instead of money, until he came and got the Works to bear, and made Money Circulate amongst the different parties who were employed by him. Yet notwithstanding the Service he was of to the Country, he had opposers and ill-wishers, and a remarkable circumstance of awful Memory occurs; of a person who endeavour'd to hinder the horses which carried the Iron Stone and Coal to the Furnaces, from coming through a road that he pretended had a right to Oppose: and one time when he saw the horses going alone, he in his Passion, wished he might Never Speak More if they should Ever come that way again. And instantly his Speech was stopped, and altho' he lived Several years after yet he Never Spoke More!

My Husband's Father died early in life; a religious good man, and an Eminent Minister amongst the people call'd Quakers.

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My Husband Abraham Darby was but Six years old when his Father died-but he inherited his genius-enlarg'd upon his plan, and made many improvements. One of Consequence to the prosperity of these Works was as they [were] very short of water that in the Summer or dry Seasons they were obliged to blow very slow, and generally blow out the furnaces once a year, which was attended with great loss. But my Husband proposed the Erecting a Fire Engine to draw up the Water from the lower Works and convey it back into the upper po6ls, that by continual rotation of the Water the furnaces might be plentifully supplied; which answered Exceeding Well to these Works, and others have followed the Example.

But all this time the making of Barr Iron at Forges from Pit Coal pigs was not thought of. About 26 years ago my Husband conceived this happy thought-tbat it might be possible to make bar from pit coal pigs. Upon this he Sent some of our pigs to be tryed at the Forges, and that no prejudice might arise against them he did not discover from whence they came, or of what quality they were. And a good account being given of their working, he errected Blast Furnaces for Pig Iron for Forges. Edward Knight Esqr a capitol Iron Master urged my Husband to get a patent, that he might reap the benefit for years of this happy discovery: but he said he would not deprive the public of Such an Acquisition which he was Satisfyed it would be; and so it has proved, for it soon spread, and Many Furnaces both in this Neighbourhood and Several other places have been errected for this purpose.

Had not these discoveries been made the Iron trade of our own produce would have dwindled away, for woods for charcoal became very Scarce and landed Gentlemen rose the prices of cord wood exceeding high-indeed it would not have been to be got. But from pit coal being introduced in its stead the demand for wood charcoal is much lessen'd, and in a few years I apprehend will set the use of that article aside.

Many other improvements he was the author of. One of Service to these Works here they used to carry all their mine and coal upon horses' backs but he got roads made and laid with Sleepers and rails as they have them in the North of England for carring them to the Rivers, and brings them to the Furnaces in Waggons. And one waggon with three horses will bring as much as twenty horses used to bring on horses' backs. But this laying the roads with wood begot a Scarcity and rose the price of it. So that of late years the laying of the rails of cast Iron was substituted; which altho' expensive, answers well for Ware and Duration. We have in the different Works near twenty miles of this road which cost upwards of Eight hundred pounds a mile. That of Iron Wheels and axletrees for these waggons was I believe my Husband's Invention.

He kept himself confined to the Iron Trade and the Necessary Appendages annex'd thereto. He was just in Ms dealings-of universal benevolence and charity, living Strictly to the Rectitude of the Divine and Moral Law, held forth by his great Lord and Saviour, had an extraordinary command over his own spirit, which thro' the Assistance of Divine Grace enabled to bear up with fortitude above all opposition: for it may seem very strange, so valuable a man should have Antagonists, yet he had. Those called Gentlemen with an Envious Spirit could not bear to see him prosper; and others covetious; strove to make every advantage by raising their Rents of their collieries and lands in which he wanted to make roads; and endeavour'd to stop the works. But he surmounted all: and died in Peace beloved and Lamented by many.

Posted by Nick Szabo at 4:49 PM

9 comments:

Serveto said...

Very, very good post.

I found it odd that one of the greatest questions historians have is how the Industrial Revolution came about, yet in any survey course of European history--the kind where the big, fat textbook covers European civilization from the Renaissance forward--very little time is spent discussing the inventions, the engineering and the conditions of the day.

Most of this stuff gets as much attention as literature and art. Although I have not measured anything, I always felt that more time was spent devoted to the Scientific Revolution than the Industrial Revolution.

As a side note, do you know of any books that do a good job of detailing the monetary history of Europe and the US? I remember being shocked when I read from my survey book of US history that the states printed their own money in the 19th century.

5:13 PM

Nick Szabo said...

Not only did states print their own money, but so did private banks. Even Joseph Smith, the Mormon founder, got in on the act. This was also done (rather better) in England, Scotland, and Ireland. There private note issue preceded by many decades central bank note issue, and was very common from the 18th to the middle of the 19th century (coincidentally or not, the beginnings and height in Britain of the industrial revolution).

I don't know of a single good reference on monetary history. The best may be *The History of Money* by Glyn Davies. It does a good job with British monetary history, but is so-so on the rest of Europe and the U.S. It also gives short shrift to the history of private bank note issue and the debate between free banking and central banking. This is better covered by The Rationale of Central Banking and the Free Banking Alternative by Vera Smith.

11:45 AM

Nick Szabo said...

BTW, it sounds like you and I agree with Abiah Darby's interlocutor: "...the Destroyers of mankind are recorded and remembered, while the Benefactors are unnoticed and forgotten."

I tried to track down who her interlocutor was in this letter via Google, with no luck. However the quote seems to have been a common sentiment at the time, as a similarly phrased sentence occurred one year later (1776) in Gibbon's *Decline and Fall of the Roman Empire*: "Trajan was ambitious of fame; and as long as mankind shall continue to bestow more liberal applause on their destroyers than on their benefactors, the thirst of military glory will ever be the vice of the most exalted characters." Sadly, our history books, which focus more on destroyers like Napoleon than on creators like the A. Darbys, continue this trend.

12:09 PM

Serveto said...

My best guess:

Historians alwyas devote more ink to their rulers--who are often their conquerors--than to inventors for two reasons.

One reason historians do so is that their rulers are symbols of their states.

Why write about every yahoo who invented something when you can just write a biography about the leader which summarizes most of the happenings?

Another possible reason is that most historians did not and (some probably still do not) treat techonological progress as the cause for

the advancement of civilization. It's easier to say King A was bad and King B was good.

9:25 PM

Nick Szabo said...

Those are good theories. My theories are that (1) historians often worked as propagandists for governments or particular politicians, thus recorded history is mostly accumulated propaganda; (2) historians and readers of history share with news media and its readers a bias towards the sensational, such as the violence and sex of politics; and (3) even when they don't personally share that bias, they draw from news sources that do.

8:45 AM

Serveto said...

Yes, I wanted to aim for a more expansive view of historians that encompasses current day historians as well as the ancients. Hence, I neglected your #1.

However, your 2 & 3 sound pretty good. And I would never have thought of 3.

6:59 PM

lang said...

On the question of free banking - or free note issuance as it would now be known - I maintain a list of good books including some snippets that I've typed in.

Prof Dowd's book includes a survey of the US experience, I recall.

1:11 PM

geoave said...

consider the oldest records we have - accounting, and names of rulers. religious records are the next. inventors tend to be employees- only the best have credit given to them.

8:30 PM

Anonymous said...

I've written a book that tells the story of Great Britain's private coins, setting it against the backdrop of the Industrial Revolution. The book, _Good Money: Private Enterprise and the Foundation of Modern Coinage_, will be published by the University of Michigan Press next spring. It offers a pretty complete history of money in Great Britain from the early 18th to the early 19th century.

7:07 AM

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